

International Lake Superior

Board of Control

Semi-Annual Progress Report to the International Joint Commission

Covering the Period September 16, 1999 to February 28, 2000



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Front Cover:

Clockwise from the upper left:

- a. Stannard Rock Light, Marquette County Michigan.
- b. Keweenaw County Snow Thermometer north of Mohawk, MI on US 41.
- c. Lake Michigan shoreline at Brevort, MI in the Upper Peninsula, late fall 1999.

International Lake Superior Board of Control



United States
BG Robert H. Griffin, Member
John W. Kangas, Secretary

Canada
Doug Cuthbert, Member
Peter P. Yee, Secretary

February 28, 2000

International Joint Commission
Washington, D.C.
Ottawa, Ontario

Commissioners:

This semi-annual report covers the Board's activities from September 16, 1999 to February 28, 2000.

1. Highlights

Lake Superior levels remained below their seasonal averages over the past six months. Water supplies to Lake Superior have been below average during the reporting period. At the end of the reporting period, the level was 20 cm (about 8 inches) below the average for that time of year and about the same as a year ago.

Below average water supplies to Lakes Michigan-Huron have kept these lakes well below average during the past six months. At the end of the reporting period, their levels were 44 cm (about 17 in) below average, and 36 cm (about 14 in) lower than a year ago.

Lake Superior outflows were essentially as specified by Regulation Plan 1977-A. A flow slightly below plan in October was due to an unexpected transformer station insulator failure, which reduced generation and water use at the US Government hydropower plant.

Except for a one gate open setting in September 1999 a one-half open gate setting has been maintained at the Compensating Works during the reporting period.

The Board expressed concern to Edison Sault Electric Co. (ESELCo) about measured power canal flows being significantly greater than its reported plant flows. Edison Sault Electric Co. is following up.

2. Monitoring of Hydrologic Conditions

During the reporting period, the Board, through its Regulation Representatives and On-Site Representatives, continuously monitored the water levels of Lakes Superior and Michigan-Huron, and the water levels and flows in the St. Marys River. The Regulation Representatives' monthly reports to the Board provided a hydrologic assessment, as well as recommendations on the regulation of outflows from Lake Superior. These reports also indicated the amount of water available for hydropower purposes, after the requirements for domestic use, navigation, and the fishery (St. Marys Rapids) were met.

Tables 1 and 2 list the recent monthly water levels, net basin supplies, and outflows for Lakes Superior and Michigan-Huron, respectively. Figure 1 compares the monthly water levels for this period to long-term averages and extremes. Figure 2 shows the monthly precipitation over the Lakes Superior and Michigan-Huron basins. Figure 3 shows the monthly net basin supply comparisons.

Precipitation over the Lake Superior basin was above average in September and October and below average for the balance of the reporting period. Due to warm and dry conditions over the Lake Superior basin during the summer water supplies were below average for the period. A snow survey of the Lake Superior basin is scheduled for late February - early March to determine the water equivalent of the snowpack.

Precipitation over the Lakes Michigan-Huron basin was below average during the reporting period. Except for (months) water supplies to these lakes were below average each month during the reporting period.

Lake Superior levels have continued to decline throughout the reporting period. They passed below chart datum of 183.2 m (601.1 ft) on January 3, 2000. Lake Superior's levels have ranged from 13 cm to 21 cm (about 5 to 8 inches) below average during the reporting period. On February 28 Lake Superior was at elevation 183.07 m (600.62 ft), 20 cm (about 8 inches) below average and about the same as a year ago at this time.

Similarly, at the start of this reporting period Lakes Michigan-Huron levels were continuing a decline which started in July 1999. Levels fell below average in November 1998 and have remained well below average. In fact, as of February 28, the level was only 30 cm (about 12 inches) above the recorded low level set in 1964. Lakes Michigan-Huron levels ranged from 33 cm (about 13 inches) to 47 cm (about 18 inches) below average during the reporting period. Levels fell below chart datum of 176.0 m (577.5 ft) on November 29, 1999 and have remained below chart datum for the balance of the reporting period. On February 28, Lakes Michigan-Huron were at elevation 175.89 m (577.07 ft), 44 cm (about 17 inches) below average and 36 cm (about 14 inches) lower than one year ago.

3. Regulation of the Outflow from Lake Superior

During the reporting period, the outflows of Lake Superior were as specified by

Regulation Plan 1977-A with some minor deviations. Except for the September 1999 one-gate open setting, the setting at the Compensating Works supplying the main portion of the St. Marys Rapids was at an equivalent one-half open setting during the reporting period. Gate 1, which supplies water to the Fishery Remedial Works, remained set at 15 m³/s (530 cfs).

4. Governing Conditions During the Reporting Period

The monthly mean levels of Lake Superior during the reporting period were within the limits of 182.76 and 183.86 meters (599.6 and 603.2 feet) specified in the Commission's Orders of Approval.

During the reporting period, the daily mean water levels in the lower St. Marys River at the U.S. Slip Gage downstream of the U.S. Lock, varied between elevations 176.80 m and 176.16 m (580.05 and 577.95 feet). Thus the requirement for maintaining the river level at that location below 177.94 meters (583.8 feet) was satisfied.

5. Compensating Works Inspection and Calibration

The 5-year major inspection of the structure is scheduled for May 22 - 26, 2000. This will be coordinated between the Corps, Environment Canada and Great Lakes Power Limited. At this time the hydroelectric plants will also be inspected.

As part of the ongoing program to re-calibrate and upgrade the discharge ratings for the Compensating Works gates, flow measurements were conducted in 1999. Additional measurements will be conducted in 2000.

Underwater video taping has indicated that there is leakage at the U.S. gates. The leakage is being evaluated by the Detroit District engineering staff and remedial recommendations will be made.

6. Repairs and Maintenance at the Hydropower Facilities

An unexpected failure of a transformer insulator at the ESELCo Portage Street Substation affected the ability of the US hydroplant to feed power to ESELCo during the October 1 - 11, 1999 period. As a result the US plant operated at about 70% capacity during the period of October 1 - 11. This unexpected partial loss of capacity caused a reduction in the flow discharged through the hydropower plant in October.

Other than normal maintenance, no major repair work was carried out at either the U.S. Government, ESELCo, or Great Lakes Power Limited hydropower plants during the period.

It is anticipated that the U.S. hydropower plant will be fully automated by January 2001.

7. Water Usage in the St. Marys River

Table 3 (Table 4 in U.S. Customary Units) lists the distribution of the outflows from Lake Superior for January 1999 through February 2000. Water uses are divided into four categories: domestic, navigation, fishery, and hydropower. According to the 1979 Supplementary Order, after the first three water requirements are satisfied, the remaining outflow from Lake Superior is shared equally between the U.S. and Canada for hydropower purposes. Any remaining flow allotment, beyond the discharge capacity of the hydropower plants, is normally discharged through the Compensating Works into the St. Marys Rapids.

As shown in the tables, the amount of water used for domestic purposes averaged about 4 m³/s (141 cfs).

The amount required for navigation lockage depended on traffic volume and varied from 4 to 18 m³/s (141 to 636 cfs). The U.S. locks were closed on January 15, 2000 and are expected to open on March 25, 2000. The Canadian lock closed for the season October 15, 1999 and is expected to reopen in mid-May 2000.

In accordance with the Commission's Orders to fulfill the fishery needs in the Rapids, a minimum Compensating Works gate setting of one-half gate open, or its equivalent, is required at all times. In addition, a flow of at least 15 m³/s (530 cfs) in the Fishery Remedial Works (through Gate 1) must be maintained. Except for a one-gate open setting in September 1999 a setting equivalent to one-half gate open was maintained in the Compensating Works during the reporting period. The flow in the St. Marys Rapids, including that through the Fishery Remedial Works, averaged about 139 m³/s (4,910 cfs) for the reporting period. Gate 1 has remained set at 15 m³/s (530 cfs). This setting is expected to continue.

Power canal flow measurements were conducted in 1998 and 1999. The results have raised Board concerns that measured power canal flows are significantly greater than the reported flows through the ESELCo hydropower plant. ESELCo was so advised by the Board and were requested that they advise the Board of what corrective action would be taken. ESELCo responded stating their awareness of the situation and that several different problem areas had been identified and would be studied. Recalibration of the wicket gates when in zero generation mode is one part of the planned remedial work. It is expected that this work will be completed by the fall 2000.

Upon completion of this work and the automation of the U.S. government plant, flow measurements will be conducted in both power canals to verify the reported flows.

At the September 15, 1999 Board the Canadian Department of Heritage discussed the feasibility of installing and operating a small, low-head hydropower unit at the Canadian lock. The Canadian navigation lock was returned to service in July 1998 following two years of extensive modifications. The unit, using the lock chamber as a part of the conveyance system, would operate 24 hours per day during the non-navigation season, and about 12 hours per day

during the navigation season. To date there has been no further information presented on this project.

8. Long Lac and Ogoki Diversions

Ontario Power Generation continued to provide the Board with information on the operations of the Long Lac and Ogoki Diversions. The Ogoki Diversions into Lake Nipigon (which flows into Lake Superior) averaged 198 m³/s (7,000 cfs) from September 1999 through January 2000. The Long Lac Diversion averaged 38.5 m³/s (1,360 cfs) for the same period. Combined, these diversions were about 166 percent of average for the period.

9. Annual Meeting with the Public and Public Information

The Board will hold its 2000 annual public meeting in Marquette, MI, Scheduled for June 27.

The Board continues to issue, at the beginning of each month, news releases informing the public about Lake Superior regulation and water level conditions. In support of the Board and the Commission, the Detroit District of the Corps of Engineers maintains a Board home page on the World Wide Web. Content includes information on Board members and responsibilities as well as copies of news releases, reports and hydrologic data summaries. A new booklet "Living with the Lakes" has been published and is being distributed to all interested parties. 19,000 copies have been distributed since its release in November 1999.

10. Rehabilitation of the Wisconsin Central Railroad Bridge

The Corps of Engineers in Detroit has been informed, via permit application, that Wisconsin Central Ltd. is proposing to renovate the existing international railway bridge across the St. Marys River in Sault Ste. Marie, MI and Ontario. This will involve the placing of three concrete piers at six of the seven spans of the bridge. The Corps is currently reviewing this application. The Corps will ask the applicant to model the potential impacts of this rehab on levels and flows in the St. Marys River and to submit a request under the Boundary Waters Treaty to the U.S. State Department.

11. Board Membership and Meetings

There was no change in the Board membership.

The Board met in Massena, NY on February 28, 2000.

Respectfully submitted,

/S/

BG Robert H. Griffin
Member for United States

/S/

Doug Cuthbert
Member for Canada

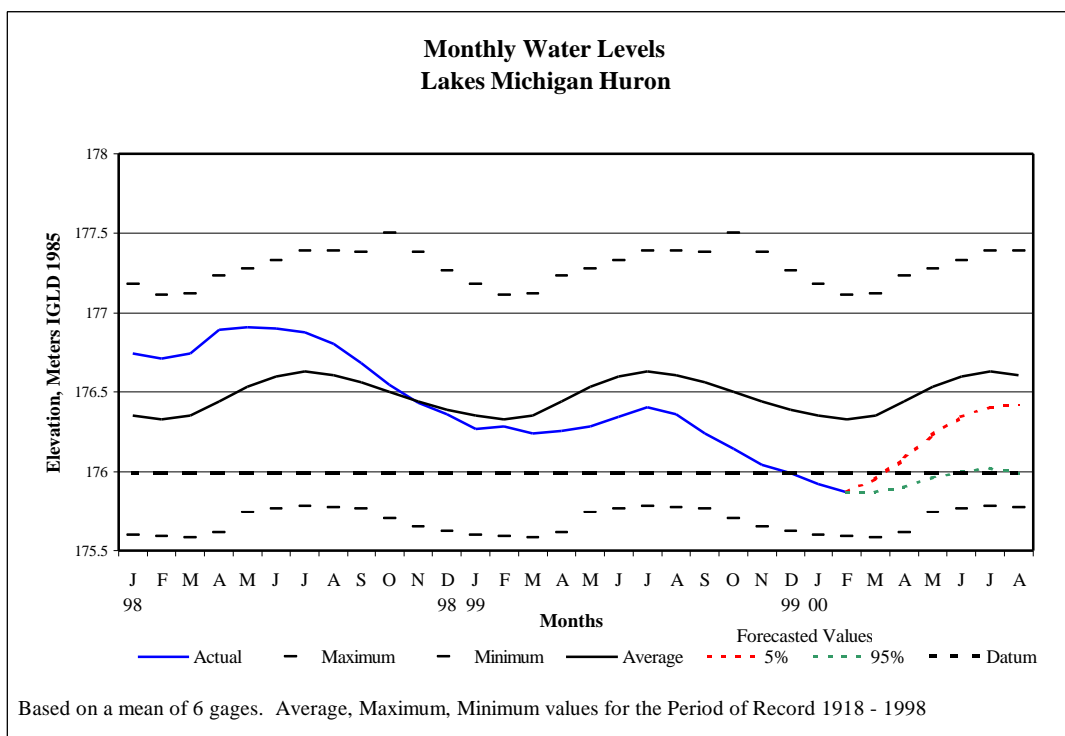
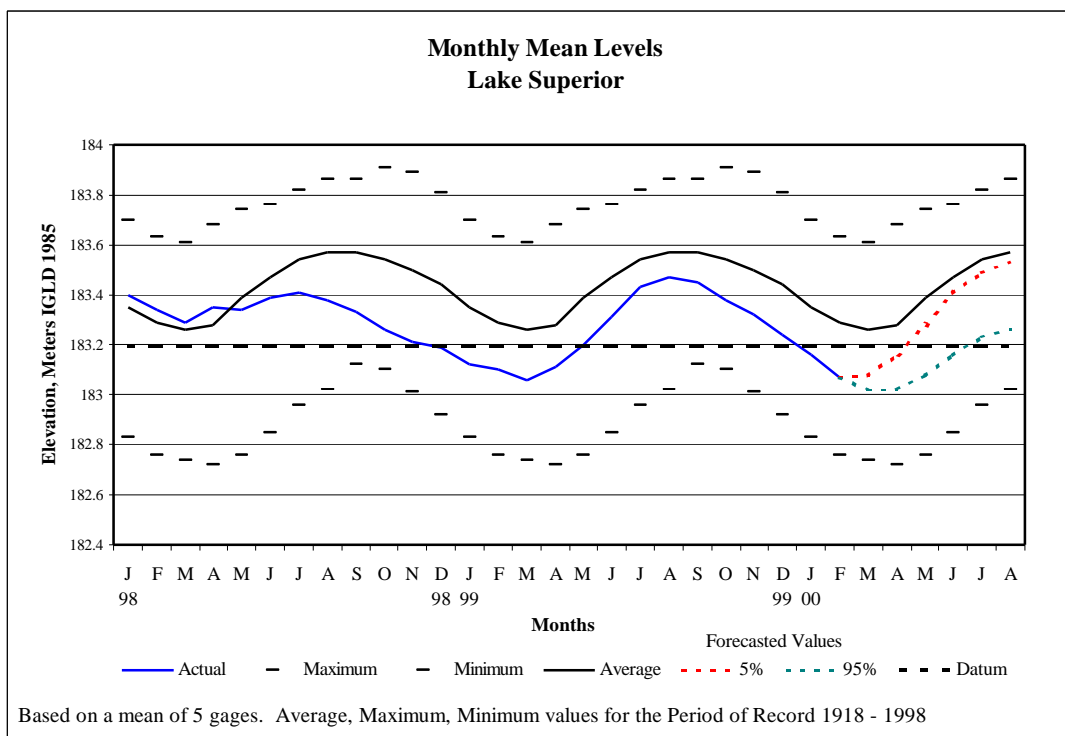


Figure 1

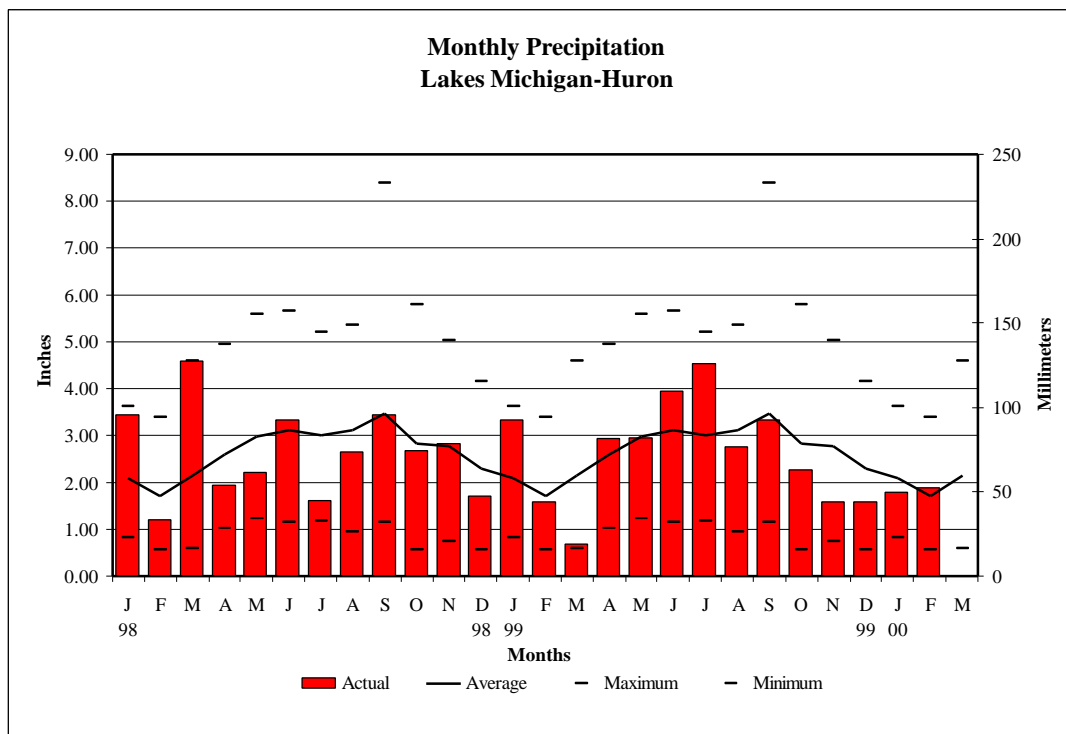
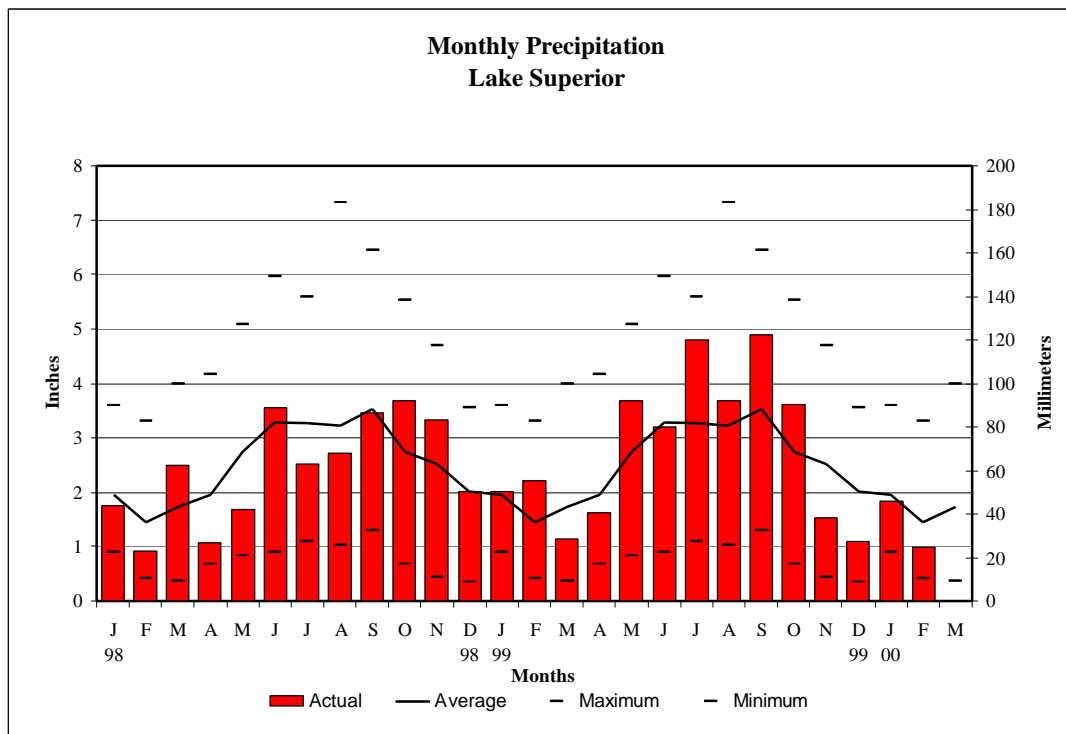
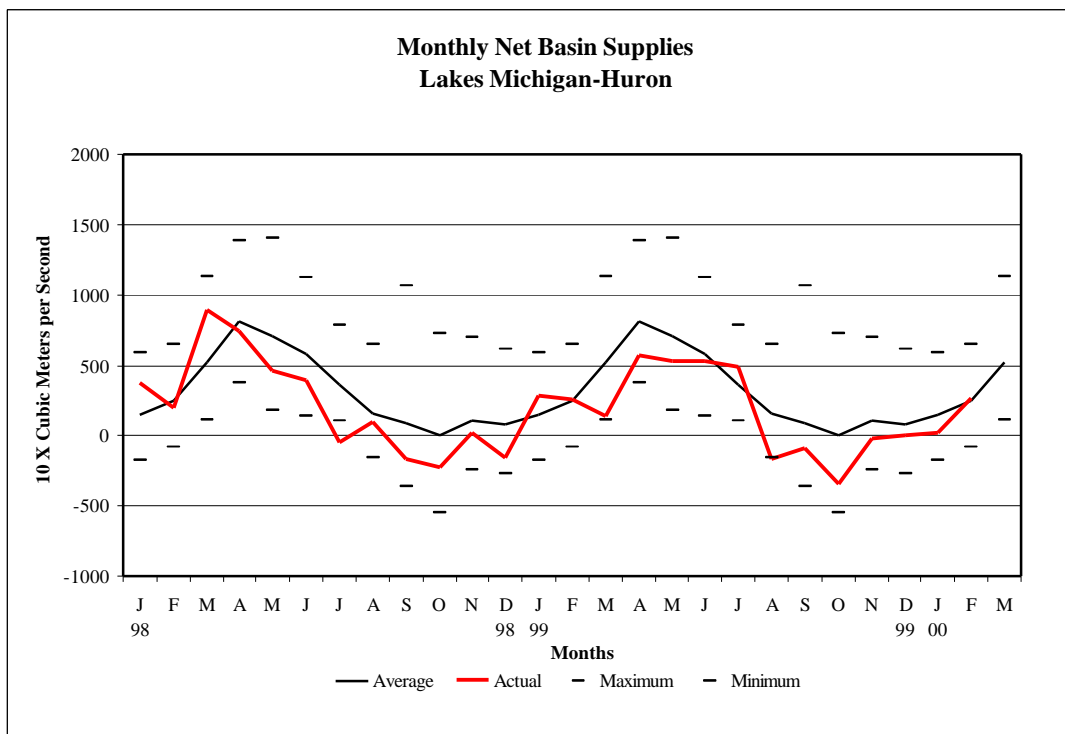
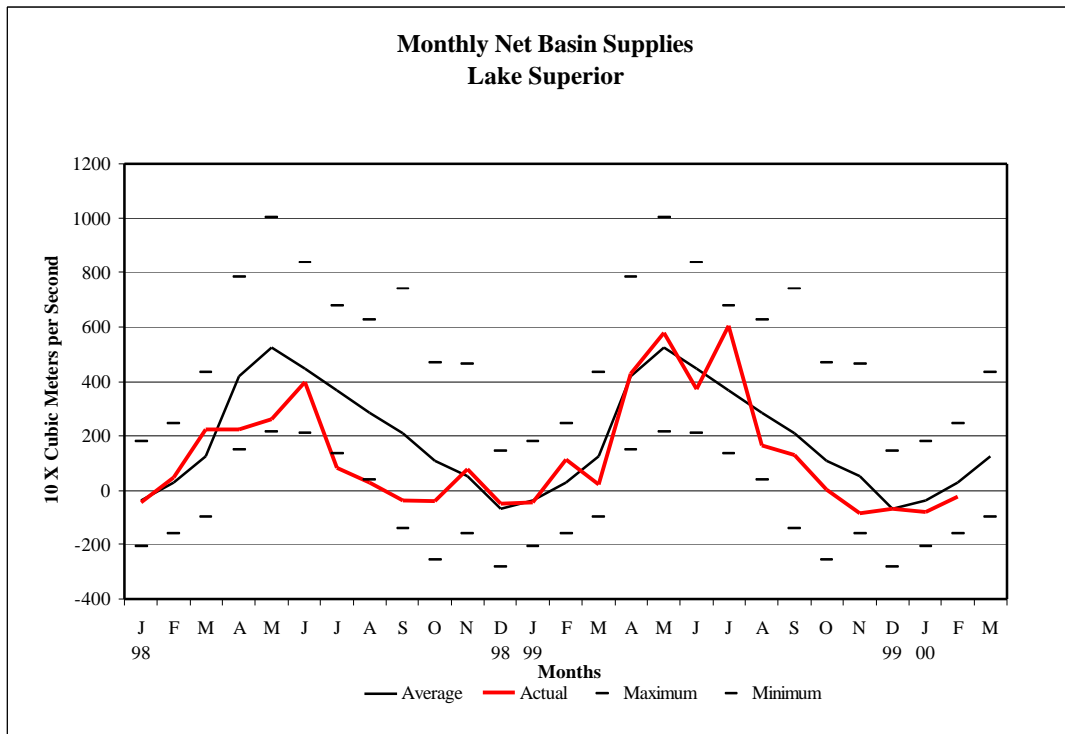


Figure 2



Note: Average, Minimum and Maximum values based on the Coordinated Period of Record 1900 - 1989

Figure 3

TABLE 1. 1999-2000 Lake Superior Hydrologic Factors

Month	Levels				Net Basin Supplies			Outflows		
	Monthly Mean Recorded ¹		Difference From Average ²		Monthly Mean Recorded		Exceedence Probability	Monthly Mean Recorded		Percent of Average ³
	metres	feet	metres	feet	m3/s	tcfs	(%)	m3/s	tcfs	
Jan-99	183.12	600.79	-0.23	-0.75	-460	-16	54	1560	55	80
Feb-99	183.10	600.72	-0.19	-0.62	1150	41	13	1560	55	82
Mar-99	183.06	600.59	-0.20	-0.66	220	8	80	1570	55	84
Apr-99	183.11	600.75	-0.18	-0.59	4270	151	46	1520	54	78
May-99	183.20	601.05	-0.19	-0.62	5760	203	38	1550	55	73
Jun-99	183.31	601.41	-0.16	-0.52	3700	131	67	2070	73	94
Jul-99	183.43	601.80	-0.11	-0.36	6060	214	3	2180	77	95
Aug-99	183.47	601.94	-0.09	-0.30	1660	59	84	2480	88	104
Sep-99	183.44	601.84	-0.13	-0.43	1300	46	68	2450	87	103
Oct-99	183.38	601.64	-0.16	-0.52	50	2	78	2220	78	96
Nov-99	183.32	601.44	-0.18	-0.59	-830	-29	86	2020	71	89
Dec-99	183.24	601.18	-0.19	-0.62	-650	-23	50	2040	72	99
Jan-00	183.16	600.92	-0.19	-0.63	-780	-28	72	1900	67	98
Feb-00	183.08	600.66	-0.21	-0.69	-210	-7	74	1780	63	94

Notes: m3/s = cubic metres per second tcfs = 1000 cubic feet per second

1 Water Levels are a mean of five gauges on Lake Superior, IGLD 1985

2 Average levels are for period 1918-1999, based on a mean of five gauges. Differences computed as metres and then converted to feet.

3 Average flows are for the period 1900-1989.

TABLE 2. 1999-2000 Lakes Michigan-Huron Hydrologic Factors

Month	Levels				Net Basin Supplies			Outflows		
	Monthly Mean Recorded ¹		Difference From Average ²		Monthly Mean Recorded		Exceedence Probability	Monthly Mean Recorded		Percent of Average ³
	metres	feet	metres	feet	m3/s	tcfs	(%)	m3/s	tcfs	
Jan-99	176.27	578.31	-0.09	-0.30	2820	100	17	4290	151	96
Feb-99	176.28	578.35	-0.06	-0.20	2620	93	44	4980	176	114
Mar-99	176.24	578.22	-0.12	-0.39	1430	50	96	4700	166	98
Apr-99	176.25	578.25	-0.20	-0.66	5750	203	84	4950	175	96
May-99	176.28	578.35	-0.26	-0.85	5270	186	79	4940	174	92
Jun-99	176.34	578.54	-0.26	-0.85	5280	186	59	5030	178	92
Jul-99	176.40	578.74	-0.23	-0.75	4850	171	20	5150	182	93
Aug-99	176.36	578.61	-0.25	-0.82	-1650	-58	98	5210	184	94
Sep-99	176.24	578.22	-0.32	-1.05	-920	-32	81	5010	177	91
Oct-99	176.14	577.89	-0.36	-1.18	-3450	-122	98	4930	174	91
Nov-99	176.04	577.56	-0.40	-1.31	-680	-24	81	4820	170	90
Dec-99	175.99	577.40	-0.40	-1.35	60	2	63	4690	166	91
Jan-00	175.92	577.17	-0.44	-1.44	-290	-10	91	4200	148	94
Feb-00	175.87	577.00	-0.47	-1.54	2250	79	54	3940	139	90

Notes: m3/s = cubic metres per second tcfs = 1000 cubic feet per second

1 Water Levels are a mean of six gauges on Lakes Michigan-Huron, IGLD 1985

2 Average levels are for period 1918-1999, based on a mean of six gauges. Differences computed as metres and then converted to feet.

3 Average flows are for the period 1900-1989.

TABLE 3: MONTHLY DISTRIBUTION OF LAKE SUPERIOR OUTFLOWS (cubic metres /second)

		POWER CANALS				NAVIGATION CANALS			DOMESTIC USAGE			FISHERY	TOTAL LAKE	
YEAR AND MONTH	US GOVT HYDRO	EDISON SAULT EL. CO	US TOTAL	GREAT LAKES POWER	TOTAL POWER CANALS	UNITED STATES	CANADA	TOTAL NAV. CANALS	S.STE MARIE US+CAN	ALGOMA STEEL	ST MARYS PAPER	TOTAL DOM. USAGE	STE. MARY'S RAPIDS	SUPERIOR OUTFLOW m^3/s
1999														
JAN	356	376	732	728	1460	2.6	0	3	0.3	4.3	0.3	5	95	1563
FEB	363	370	733	731	1464	1.4	0	1	0.3	4.3	0.3	5	95	1565
MAR	365	371	736	732	1468	2.9	0	3	0.3	4.4	0.3	5	94	1570
APR	368	367	735	674	1409	10.2	0	10	0.3	4.2	0.3	5	95	1519
MAY	362	365	727	705	1432	13	0.5	14	0.4	3.6	0.3	4	96	1546
JUN	366	630	996	953	1949	16.1	1.2	17	0.4	3.6	0.3	4	99	2069
JUL	369	691	1060	994	2054	17.6	2.3	20	0.4	3.6	0.3	4	100	2178
AUG	366	725	1091	989	2080	15.5	2.4	18	0.4	3.6	0.3	4	382	2484
SEP	355	712	1067	1035	2102	15.7	1.9	18	0.4	3.6	0.3	4	325	2449
OCT	330	691	1021	1055	2076	12.5	0.7	13	0.3	3.6	0.3	4	124	2217
NOV	368	591	959	944	1903	11.6	0	12	0.3	3.4	0.3	4	99	2018
DEC	368	592	960	962	1922	11.2	0	11	0.3	3.6	0.3	4	99	2036
2000														
JAN	351	550	901	888	1789	3.9	0	4	0.3	3.6	0.3	4	99	1896
FEB	367	478	845	833	1678	1.4	0	1	0.3	3.7	0.3	4	99	1782
MAR														

Note: Power Canals columns include flows through power plants and spillways

TABLE 4: MONTHLY DISTRIBUTION OF LAKE SUPERIOR OUTFLOWS (cubic feet / second)

		POWER CANALS				NAVIGATION CANALS			DOMESTIC USAGE			FISHERY	TOTAL LAKE	
YEAR AND MONTH	US GOVT HYDRO	EDISON SAULT EL. CO	US TOTAL	GREAT LAKES POWER	TOTAL POWER CANALS	UNITED STATES	CANADA	TOTAL NAV. CANALS	S.STE MARIE US+CAN	ALGOMA STEEL	ST MARYS PAPER	TOTAL DOM. USAGE	STE. MARY'S RAPIDS	SUPERIOR OUTFLOW m^3/s
1999														
JAN	12600	13300	25900	25700	51600	92	0	92	11	152	11	174	3350	55200
FEB	12800	13100	25900	25800	51700	49	0	49	11	152	11	174	3350	55300
MAR	12900	13100	26000	25900	51900	102	0	102	11	155	11	177	3320	55500
APR	13000	13000	26000	23800	49800	360	0	360	11	148	11	170	3350	53700
MAY	12800	12900	25700	24900	50600	459	18	477	14	127	11	152	3390	54600
JUN	12900	22200	35100	33700	68800	569	42	611	14	127	11	152	3500	73100
JUL	13000	24400	37400	35100	72500	622	81	703	14	127	11	152	3530	76900
AUG	12900	25600	38500	34900	73400	547	85	632	14	127	11	152	13500	87700
SEP	12500	25100	37600	36600	74200	554	67	621	14	127	11	152	11500	86500
OCT	11700	24400	36100	37300	73400	441	25	466	11	127	11	149	4380	78400
NOV	13000	20900	33900	33300	67200	410	0	410	11	120	11	142	3500	71300
DEC	13000	20900	33900	34000	67900	396	0	396	11	127	11	149	3500	71900
2000														
JAN	12400	19400	31800	31400	63200	138	0	138	11	127	11	149	3500	67000
FEB	13000	16900	29900	29400	59300	49	0	49	11	131	11	153	3500	63000
MAR														

NOTES 1. Power Canals columns include flows through power plants and spillways.

2. Flows for individual users were originally coordinated in m³/s, and are converted here to U.S. customary units (cfs) and rounded to 3 significant figures. Total flow for each category and total Lake Superior flow in this table are computed from the individual flows in cfs.